Perimeter and Area: Round and Round We Go

Brief Overview:

The students will develop the concept of perimeter by counting units around a variety of geometric shapes. They will also develop the concept of area by counting square units within a variety of geometric shapes.

NCTM Content Standard/National Science Education Standard:

Geometry

Grade/Level:

Grade 2

Duration/Length:

3 days (50-60 minutes each day)

Student Outcomes:

Students will:

- Identify perimeter by counting units around a geometric figure.
- Determine area by counting square units within a geometric area.

Materials and Resources:

8 one-inch tiles in a Ziploc baggie (one bag per student)
The Teacher and the Garden (Student Resource Sheet-1)
1-inch grid paper (Student Resource Sheet-2) 1 per student
16 craft sticks per student
Spaghetti and Meatballs for All! A Mathematical Story, by Marilyn Burns
1 Geo-board and 2 rubber bands for each student
1 12x18 sheet of paper per student
Glue and crayons
Overhead projector
Transparency of Student Resource Sheet-3
Find the Area Student Resource Sheet - 4, one per student
Find the Area: Answer Key Teacher Resource Sheet - 5, Teacher
The Baltimore Zoo Student Resource Sheet-6, one per student
The Baltimore Zoo: Answer Key Teacher Resource Sheet-7, Teacher

Development/Procedures:

Lesson 1

Preassessment – Ask students to stand behind their chairs. Without giving specific details, say, "Please move to the perimeter of the room." Without giving feedback, observe students as they move around the room. This should take no longer than 1 minute.

Launch – As students are trying to find the perimeter, give them some clues about what the word **perimeter** means. For example: the border around the bulletin board, frame around a picture, the fence around a garden, a cage around an animal habitat, etc. Have students identify similarities between these examples and then locate the perimeter of the room.

Teacher Facilitation – Working with the students develop a definition of **perimeter** while they are still standing around the perimeter of the room. As the students are returning to their seats, ask them to look for other examples of perimeter. Guide them to an awareness that all things have a perimeter. At this point explain to them that **perimeter** is the distance around a given figure.

Student Application – (You may pair the students or have them work individually.) Hand out craft sticks and give the students two minutes to explore them at their seats. Ask them, "If we are getting ready for [insert season/event] and we want to decorate, we could start by creating a border for our desk. How can we find out how much border we need for each of you? How can we use these craft sticks to measure the perimeter of your desk top?" Take a few minutes to try this. Compare the class results. Does everybody need the same amount? Discuss variances for 1 minute.

Embedded Assessment – Ask the students why we need to measure the perimeter. Read the story "The Teacher and the Garden." (Student Resource Sheet-1) Hand out 12"x18'' paper. Ask students to create a garden fence using craft sticks to represent the fence around the perimeter of the garden. Ask them to identify the number of craft sticks used to create the garden fence. Have them record this information in the center of the garden. (If time permits, have students glue down their sticks and then draw a garden inside the perimeter.)

Reteaching/Extension –
- For those who have not demonstrated a concrete understanding of perimeter, provide more hands-on practice using coffee stirrers, toothpicks, pretzel sticks, etc.
- Read Racing Around, by Stuart J. Murphy

Development/Procedures:

Lesson 2

Preassessment – Journal entry: Students will use pictures and words to describe
perimeter. Share a few responses.

Launch – Read aloud Spaghetti and Meatballs for All! A Mathematical Story by Marilyn
Burns.

Teacher Facilitation – Discuss the events in the story. Encourage students to identify
reasons why the characters ran out of spaces at the tables before everyone had arrived.
Have students return to their seats and give them a bag of one-inch tiles. Explain that the
tiles represent the tables in the story. Model how four people can sit around one table, by
sitting one person on each side. Tell the students that as you reread the story they will use
the tiles to recreate the events of the story.

Student Application – As the teacher rereads the story, students will form the table
arrangements. Use the illustrations to assist students as they create the table
arrangements. Ask them to determine how many people can sit around the perimeter of
each new table arrangement.

Embedded Assessment – Give each student a piece of one-inch grid paper (Student
Resource Sheet-2). Have the students use their tiles to create one closed geometric figure
that uses 8 tiles. The tiles must be connected by at least one side (not corner to corner.)
Students should trace this figure on the grid paper. Have students determine the perimeter
of their figure by counting the non-connected sides of the figure. Students should record
the number of units in the perimeter at the bottom of the grid paper. Use the term "units"
as a label for the perimeter, i.e. "The table has a perimeter of 18 units."

Reteaching/Extension –
  - For those who have not completely understood the lesson, encourage students to
    mark each unit on the perimeter, as they are counted.
  - For those who have understood the lesson, challenge students to use the 8 tiles to
    create a geometric shape with the greatest or least possible number of units in the
    perimeter.

Development/Procedures:

Lesson 3

Preassessment – Have the student form a geometric figure using six 1-inch tiles. Have
them write a description of their figure. At this point, the teacher will be walking around

and observing how many students have an understanding of **area** by reading the students written descriptions.

Launch – Show the students Student Resource Sheet-3 on the overhead. Explain that the figure is a map of a room in [your house, classroom…]. The rectangle represents the place where tile squares are going to be placed. "Help me determine how many tile squares I will need to cover this **area**." Tell the students that 1-inch tiles will be used to help solve this problem.

Teacher Facilitation – Have students estimate how many tiles it will take to completely cover the inside area of the rectangle. Record a few answers on the corner of the overhead. Throughout the activity refer back and adjust the estimates as needed. The teacher will have students verbally give ideas on how to proceed through the activity. Have some students come up and begin covering the rectangle with the tiles. When the rectangle is completed, ask the students for ideas on how to find out how many tiles will be needed to complete the project and cover the **area** (count them). At this point explain that **area** is the total measurement of the inside of the figure. Reiterate that perimeter goes around the outside edge, but **area** is the inside of the figure. Encourage the students to describe events where a measurement of area is needed, i.e. rug, wallpaper, tablecloth, bedding…

Student Application – [Partner activity] Have the students form different sized rectangles on the geoboards. They should figure out the **area** by counting the square units that are part of the geoboard. Then try to form other shapes, such as "L". Have the students count the square units to determine the **area**. (The teacher **should not** refer to the formula of length times width.)

Embedded Assessment – Determine each student's progress by observing the students as they work to complete Student Resource Sheet-4. They will find the area and write it in the space provided.

Reteaching/Extension –
- For students who have difficulty with the geoboard draw lines to form a grid pattern on the geoboard (overhead markers will wash off). Another alternative is to allow the students to utilize tiles in order to create the geometric figures.
- An enrichment activity: Have the students create a figure and find the area and the perimeter. They can also work to create a figure that has the same area as the first, but a different perimeter. This activity can be done with the tiles or the geoboard.

Summative Assessment:

Students will complete the assessment activity (Student Resource Sheet-6) by identifying perimeter and area of animal habitats at the Baltimore Zoo. They will find the perimeter by counting units around each habitat. They will determine area by counting square units within each habitat. As a writing activity, students will explain how they found the perimeter and area of each habitat. This may be completed on the back of the Resource Sheet.

Authors:

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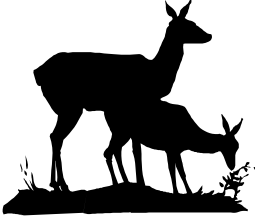
The Teacher and the Garden

Every summer during vacation, I plant a vegetable garden next to my house. I grow cucumbers, tomatoes, lettuce and zucchini. But every summer, I have a problem. The deer and rabbits nibble on *all* of my plants! My vegetables are ruined every time!

But… I have a plan for next summer. Do you want to know what it is?

I am going to protect my vegetables, by surrounding my garden with a strong, tall fence. My only problem is that I don't know where to put my fence. Do you have any ideas? (Discuss possibilities).

Before I plant my garden, I think it will be a good idea to first build my fence. That way, when my seedlings start to grow, the deer and rabbits won't be able to nibble on them. Would you help me to plan my garden fence?

Written By Risa Halpren & Elizabeth Ansley

Name_____Date_____

(Transparency)
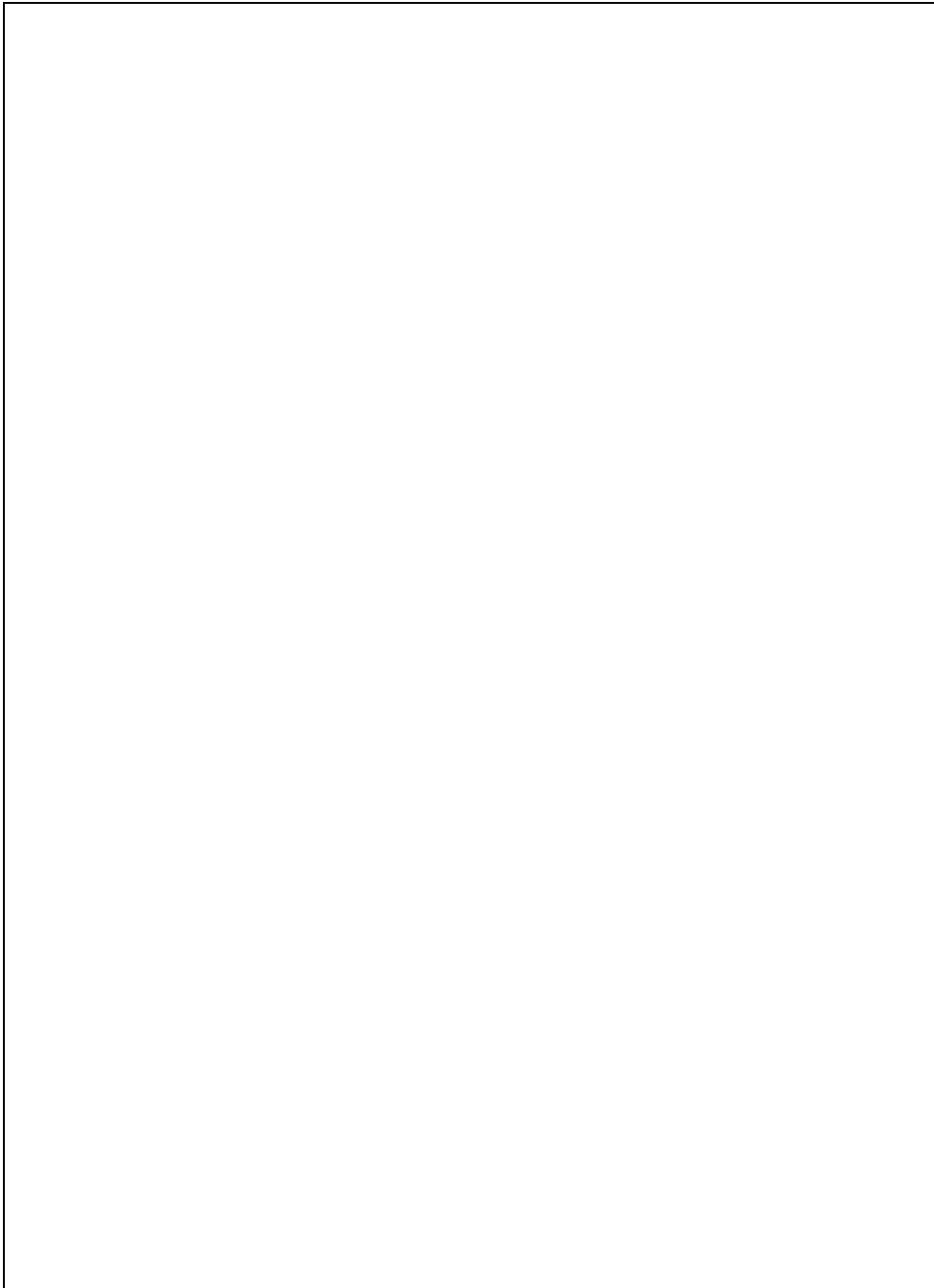
Name _____ Date _____

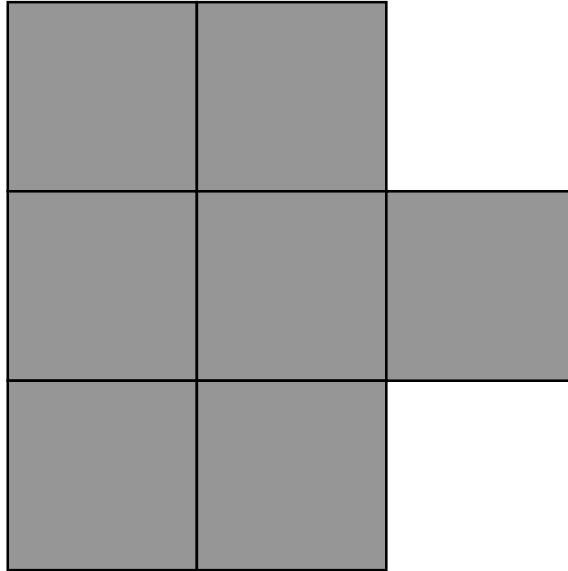Find the area of each figure.

1.
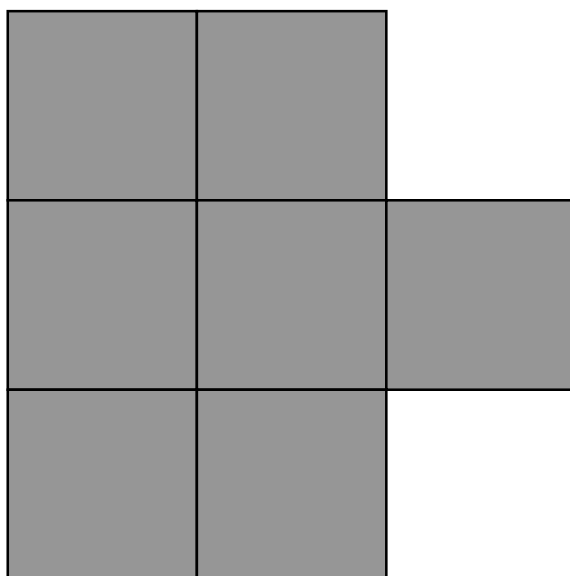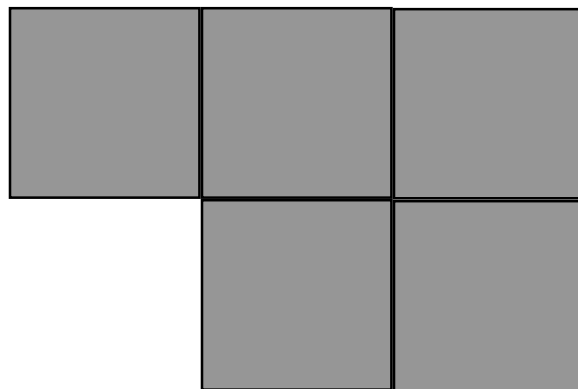
_____square units

2.
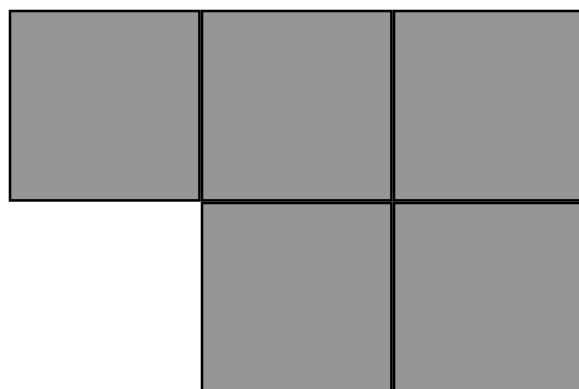
_____square units

Answer Key

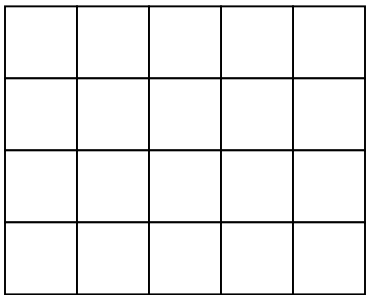Find the area of each figure.

1.

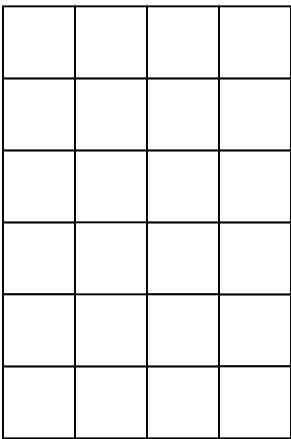_____7_____square units

2.

_____5_____square units

Name_____ Date _____

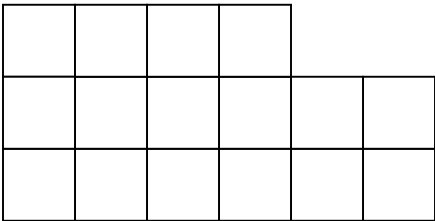Find the area and perimeter. Record your answers on the table.
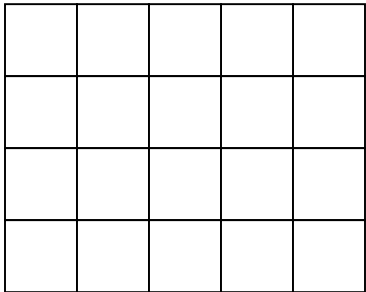
The Baltimore Zoo

Tigers

Lions

Monkeys

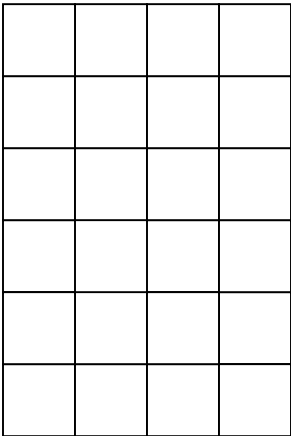| The Baltimore Zoo		
Animal Habitat	**Perimeter**	**Area**
Tigers	_____Units	Square _____Units
Lions	_____Units	Square _____Units
Monkeys	_____Units	Square _____Units

Answer Key
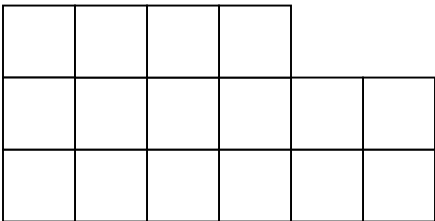Find the area and perimeter. Record your answers on the table.

The Baltimore Zoo

Tigers

Lions

Monkeys

The Baltimore Zoo		
Animal Habitat	**Perimeter**	**Area**
Tigers	_____18____Units	Square ____20_____Units
Lions	_____20__Units	Square ____24_____Units
Monkeys	_____18___Units	Square ____16_____Units